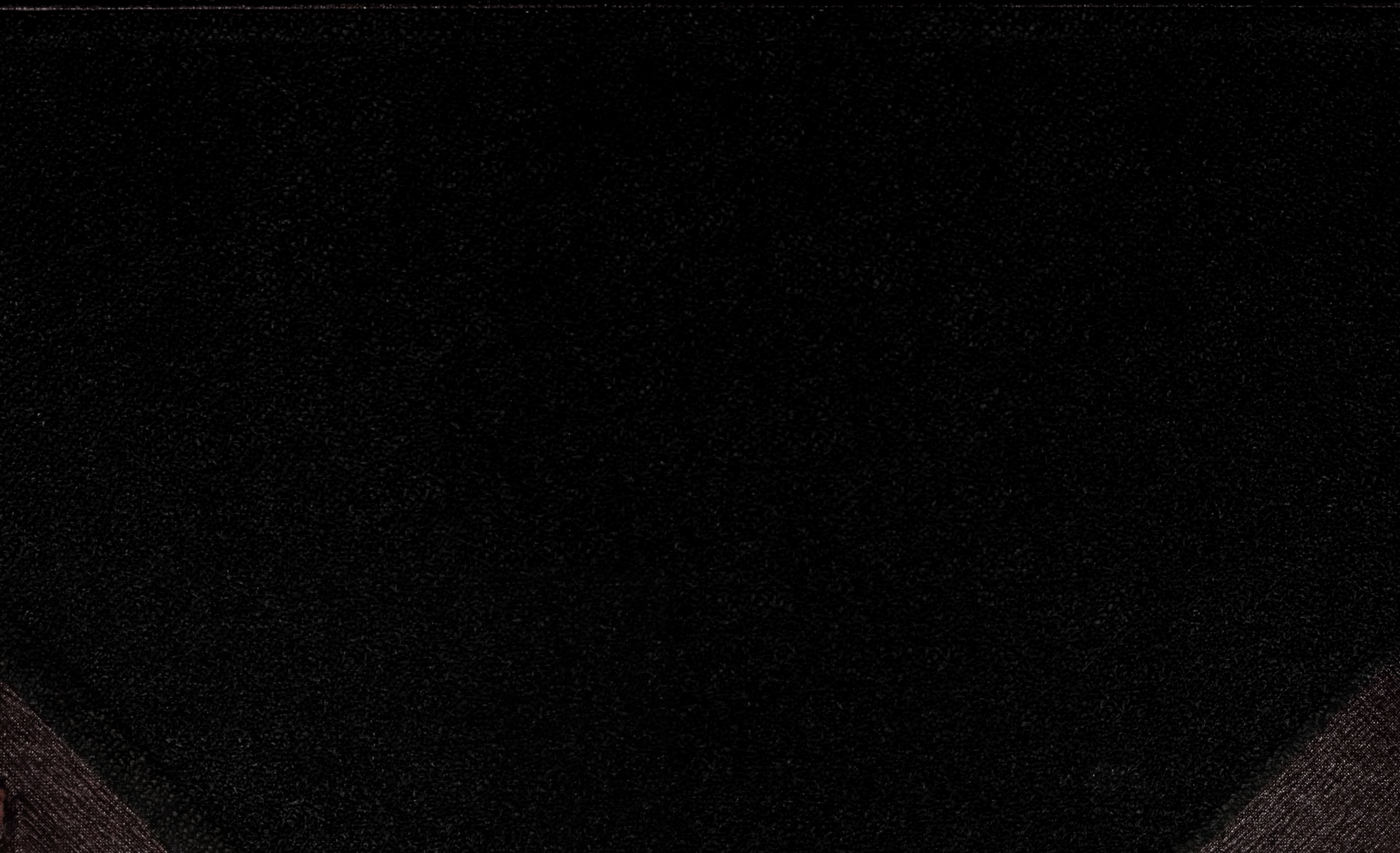
Arnold Dorothy Phonoaudiometer in the public schools.
1936



BOSTON UNIVERSITY

SCHOOL OF EDUCATION

Thesis

THE PHONOAUDIOMETER IN THE PUBLIC SCHOOLS

Submitted by

Dorothy Arnold

(Ed.B., Rhode Island College of Education, 1929)

In partial fulfillment of requirements for the
degree of Master of Education

1936

First Reader: Prof. Roy O. Billett, Professor of Education
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CHAPTER I

THE PROBLEM AND PROCEDURES

I. Introduction

A great deal of research has been conducted in studying the totally deaf, and an appreciable amount of work with the hard of hearing, but very little time has been devoted to those with minor defects in hearing. Waldman, Wade, and Aretz in their book, "Hearing and the School Child," say:

> "It has rather recently been learned that partial deafness among children is one cause of school retardation. Commendable research has been conducted in studying the totally deaf and the effect of their condition upon educationalaccomplishment; and several studies have made the relationship between partial deafness and school failures evident; but little of a scientific nature has been done to ascertain the extent to which slightly defective hearing affects educational progress. The so-called minor defects in hearing have been overlooked and their deleterious effects upon education have not been recognized." [1]

It is of primary importance that children with slight hearing defects be discovered early enough in their lives so that a remedy of some sort may be effected. The children of today are far more fortunate than those in former years in this respect. Statistics show that all the school departments in 36 out of 48 states have access to the 4-A audiometer.[2] A closer relationship seems to exist between the school doctor, the family physician, the otologist, and the teachers than heretofore.

[1] J.L. Waldman, F.A. Wade, and C.W. Aretz, Hearing and the School Child, Philadelphia, Volta Bureau, Washington, D.C., 1930 P. 14

[2] A.C. Norris, "Report of the Federation Committee of Hard-of-Hearing Children," Bulletin of the American Federation of Organizations for the Hard of Hearing, Inc., October 1932. P. 4

CHAPTER I

THE PROBLEM AND PROCEDURES

I. Introduction

In recent years the Civil Works Administration, one of the government projects, is doing the testing of hearing of school children. Helen M. Collins[1] in her report, "The 4-A Audiometer and the C. W. A. in Florida," says:

> "Approximately 2,754 children have been tested. Of this number 346 have had special investigations.
>
> "Civil Works project 177 for the conservation of hearing of school children was inaugurated on January 23, 1934 as a Civil Works Service Project. Its major aim was to ascertain the hearing conditions of the public school children of New York City and, as far as possible, to make provisions for the education and medical care of these children. Since the standard equipment for testing hearing is designed for testing from the third year up, the goal established was the testing of 600,000 children from grades 3A through 9B."[2]

We find that each year there are more organizations, universities, colleges, and schools offering courses to teachers who wish to train themselves to teach classes for the hard-of-hearing children.

> "Organizations for the hard-of-hearing are rendering invaluable service in the progress that has been made. They have encouraged training of teachers, spread knowledge regarding methods, and have cooperated with public and private schools. The New York League for the Hard of Hearing has rendered a great service to the deafened child through its educational department and its employment bureau. Through their efforts, many children are able to progress normally from grade to grade in public schools, and to maintain their places in a varied list of appropriate occupations."[3]

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[1] Helen M. Collins, "The 4-A Audiometer and the C.W.A. in Florida," Volta Review 36: May 1934, P. 294

[2] Daniel Caplin, Report on Civil Works Project 177 for the Conservation of Hearing of School Children, April 1, 1935

[3] Waldman, Wade and Aretz, Op. cit. P. 187

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We find that each year there are more organizations, universities, colleges, and schools offering courses to teachers who wish to train themselves to teach classes for the hard-of-hearing children.

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2. The Problem

The purpose of this study is to determine changes, if any, in the scholastic standing of pupils with defective hearing, and of different levels of mental ability as shown by intelligence quotients, following the discovery of defects and efforts, if any, at remedying these defects.

Limited time did not permit a thorough study of all phases of this subject. Attendance, eye defects, speech defects, and nationality which enter into the study were considered briefly. Each one of these in itself would have been a separate study. The following points are considered in the survey of 196 boys and girls of eight public junior high schools in Providence, Rhode Island.

What school progress is shown after educational treatment is given?

What school progress is shown after medical and educational treatment is given?

3. Methods of Studying the Problem

The study was begun with a review of all the available literature published in the field. Very little research was found done in this field.

Next the school doctor was interviewed, and he furnished the names, addresses, age, sex, hearing-loss, and case histories of 196 children who were to be studied.

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Next the school doctor was interviewed, and he furnished the names, addresses, age, sex, hearing-loss, and case histories of 196 children who were to be studied.

A card (Appendix) was then prepared for each child, with the name, address, intelligence quotient, age, sex, grade, hearing-loss, case history, and medical treatment. The improvement, retrogression, and non-improvement in scholarship in the subjects were noted.

The writer obtained the authority of the Providence School Department to use the records filed in the offices of the eight junior high schools. From these were gathered the intelligence quotients, and the marks of mathematics, English, and non-academic subjects. The Otis Group Intelligence Test was used to obtain the intelligence quotients. The marks are the subjective judgment of the teachers. While this was not entirely satisfactory, it was the best that could be obtained. In both subjects, Mathematics and English, achievement tests which were prepared by the school department were given to the children at the end of the term, so that the marks of these two subjects were not entirely subjective. The marks on the permanent record cards show the results of the achievement tests and also the results of class work done throughout the year. The so-called non-academic subject marks are subjective. These subjects include science, social science, wood working, music, printing, home economics, art, machine shop, occupational civics, junior business training, mechanical drawing, penmanship, and spelling, health, and physical education. The non-academic subjects were marked "1", "2", and "3", while mathematics and English were marked "A", "B", "C", "D", and "I" (Appendix).

The marks were taken for all pupils at the beginning of the year-and-a-half period, and at the end of the year-and-a half period, so that each child was given the same amount of time to show improvement, retrogression, or non-improvement in each subject.

While the languages, French, Latin, and Italian are listed on the cards, none of the 196 cases had taken these.

The 4-A audiometer or phonoaudiometer was used to give the hearing tests. This instrument was developed in 1925 as a result of the work of a "Committee on the Survey of Hard of Hearing Children, of the American Federation of Organizations for the Hard of Hearing.[1] It is described as follows:

"The 4-A Audiometer consists of the instrument itself, which looks not unlike a medium size suitcase, this containing the electrically equipped device by means of which a voice coming from a record is heard by the children through wires and receivers, first in one ear and then in the other. In addition to the main instrument with its one ear piece, are trays, each tray containing eight receivers with accompanying cords; these trays can be jacked together and then to the phonograph."[2]

A two-digit test record was used for recording the numbers. When both were correct a number was considered to be satisfactory. Defective hearing was recorded or scored when the hearing loss was nine or more sensation units (Appendix, about 7.5 per cent) in either ear.[3] The records of those having passed the tests were left with the principal of the school to be placed on file for further reference.

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1 Mrs. James F. Norris, "The 4-A and Other Audiometers," Bulletin of the Massachusetts Department of Public Health. Vol. 17, No. 2, April-May-June, 1930. P. 83

2 Ibid

3 Dr. Charles B. Lewis, Report of the Testing of Hearing Through Use of the Audiometer. A paper written by Dr. Lewis, Providence, 1932, PP. 1-3

Pupils who failed to make a satisfactory score in the first test, or those whose record indicated nine or more sensation units loss in hearing for each ear, were given a second test for the purpose of eliminating certain errors that may occur in any test. The re-test was given by use of another phone set, in order to be sure that the set was not at fault. A third test was given to those who failed in the second test. This was desirable since it showed further elimination, some variation, and in other cases almost identical results in all these tests.

The scores of those who failed, with a list of names and other helpful information, were sent to the central office. A list of the pupils found to be defective was sent to the principal of the school, with a letter asking that they be given proper and careful consideration in seating, with the normal or better ear toward the teacher, so that they might get the full benefit of the teacher's instruction. (Appendix)

> "The follow-up of these cases by the school nurses for the present includes:
>
> 1. The interviewing of each pupil receiving a notification slip with specified directions for procedure.
>
> 2. Home visits to advise with parents concerning the defects.
>
> 3. A letter given to each pupil with an enclosed card and stamped envelope, to the parent, asking that the child be examined and the card filled in by the physician at the time of the examination, and returned to the school office." (Appendix).[1]

[1] Dr. Charles B. Lewis, Report of the Testing of Hearing Through Use of the Audiometer. Pp. 3-4

"The history of these cases shows that many of the pupils have, or have had, colds, painful or running ears, mastoid, etc. Further examination reveals nasal obstruction, adenoids, enlarged tonsils or diseased tonsils, various malformations, impactions of wax and foreign bodies.

"Some of the pupils who were examined in the previous test were found to have improved hearing; others to have more defective hearing.

". . . Arrangements were made for the cooperation with the hospitals in the City of Providence, for the care of those cases unable to be attended by private physicians or specialists."

Dr. Lewis goes on to report that:

"The hospitals report that the service available is already overtaxed, and feel that they are unable to give extended service. An otologist has been added as a diagnostician in the service of the school department in order that there may be an efficient follow-up of the cases with the defective hearing, for those pupils whose parents cannot afford the service of a private physician.

"The examination by the otologists is necessary in order that further recommendations be made for instruction in lip-reading." [1]

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CHAPTER II

THE CONDITIONS WHICH EXIST AFTER EDUCATIONAL TREATMENT IS GIVEN TO A GROUP OF CHILDREN WITH DEFECTIVE HEARING

1. Groups Receiving Educational Treatment

The first part of this study is concerned with the improvement, retrogression, and non-improvement in scholarship shown by children with impaired hearing, after educational treatment has been offered them.

The educational treatment of children found to have defective hearing is very important. After the discovery of these cases, special places were assigned them in the front of the class room, with the normal ear or the ear with less hearing loss toward the teacher. When there were cases with more serious defects, these children were recommended for lip-reading classes.

The hard-of-hearing children many times resort to lip-reading to compensate for the defective hearing. A report entitled "Deaf Graduates of Schools and Colleges for Hearing Students" reports:

> "Students so deaf as to have required initial instruction in special schools or from special teachers have nevertheless continued their studies in the ordinary schools for pupils of normal hearing and have secured diplomas."[1]

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A "Report of the Commission on Education of the American Federation of Organizations for the Hard of Hearing"[1] tells us that:

> "It has long been known that defective hearing is not as easy to detect as lowered vision. Frequently a child adjudged stupid or mentally deficient may have been simply hard-of-hearing. When speech-reading is learned (and children learn it more readily than adults), and the child is properly seated in relation to his teacher and the class, he often becomes a star pupil. Another baffling problem is sometimes solved by the hearing test - that of the child who hears much, but has a slight defect which prevents him from understanding certain degrees and kinds of sound. The difficulty once discovered, methods can be devised to overcome it."
>
> ". . . There is waste of money in educating the hard of hearing child by ordinary methods; in one school 57 hard of hearing children repeated 66 classes; 57 of normal hearing, picked at random from the same school, repeated 18 classes. In another city a careful study of all retarded pupils showed that, of children who had to repeat grades, there were three and one half times as many hard-of-hearing as those of normal hearing. . . If proper methods are used to find the hard-of-hearing, and to treat them medically and educationally, more money will be saved by preventing their retardation than will be used to discover and treat them. . . Only such children as show the effects of deficient hearing in their school work will need to be given special instruction, and this will cease to be needed when these pupils have acquired such facility in speech reading that they can profit by ordinary methods of teaching.
>
> "In organizing and conducting classes for hard-of-hearing children, any beginning is better than none at all, and experience has shown that, once a start is made, advancement in methods follow rapidly."

In order to show the varying degrees of hearing loss, it was necessary to divide the numbers of children into six groups of different levels of hearing ability (Appendix). They are as follows:

[1] The Hard of Hearing Child, School Health Studies, No. 13, Department of the Interior, Bureau of Education, A Report of the Commission on Education of the American Federation of Organizations for the Hard of Hearing, Washington, D.C. P. 11.

Group I - Less than 15 sensation units loss - moderate or border line cases.

Group II - 15 or more sensation units loss in both ears.

Group III - 21 or more sensation units loss in one ear.

Group IV - 21 or more sensation units loss in both ears.

Group V - Total loss of hearing in one ear.

Group VI - Total loss of hearing in both ears.

Group I above shows those with less than 15 sensation units loss in both ears, classified as border line cases. Although these cases were on the border line we should not neglect them in preference to the others. A border line case may, without proper care and treatment, become more serious. The impairment does tend to become greater as time goes on, if not properly treated.

The largest number of pupils to improve their scholarship was found in Group I. Out of 138 cases who received educational treatment, 23 of the 59 children showing improvement in mathematics during the year and a half period were border line cases (Table I). Marked improvement was also shown in Groups II and III. The intelligence quotients of the four cases which improved two points, that is from "C" to "A", were comparatively high (Table 1, column 2). A check of all cases revealed that the intelligence quotients were factors of prime importance

Table 1. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Not Receiving Medical Attention, and Showing Different Amounts of Improvement in Scholarship as Indicated by Their Marks in Mathematics.

Amounts of Improvement Shown	Intelligence Quotient: 111 or above — Levels of Hearing Ability							Intelligence Quotient: 90 - 110 — Levels of Hearing Ability							Intelligence Quotient: 89 or less — Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "I" to "C"			1				1		1	1				2		1			1		2
From "D" to "C"							0	3	1					4	4	1					5
From "C" to "B"	2	2	3		1		8	4	7	6		1		18	6	3	2				11
From "C" to "A"	1	1			1		3		1					1			1				1
From "B" to "A"	1	1					2	1	1					2							0
Total	4	4	4	0	2	0	14	9	10	7	0	1	0	26	10	5	3	0	1	0	19

Table 1. Number of Pupils in Groups of Different Levels of Reading Ability and Mental Ability, Not Receiving Special Instruction, and Changing Patterns of Improvement in Reading Ability as Indicated by Their Marks in Mathematics.

| Improvement in Reading Ability (1) | Intelligence Quotient | | |

governing the amount of improvement, retrogression, and non-improvement in each case.

The numbers of children, whose scholarship in mathematics retrogressed was relatively small. Only 16 of the 138 cases receiving educational treatment retrogressed in scholarship (Table II, columns 8, 15, and 22). Three of these dropped two points, "C" to "I". They were children whose intelligence quotients were below 89 and they had also been transferred to different teachers.

Table III shows that the greatest numbers of pupils in all groups of hearing ability showed no improvement at all. Stability of marks were recorded in 63 out of 138 cases.

Defective hearing groups studying English showed the same relation to each class as in mathematics. That is, there were 58 children whose marks improved in scholarship, 19 who retrogressed and 61 showing no improvement at all. (Tables IV, V, and VI).

Perhaps the most noticeable changes in the three classifications of subjects were in the non-academic subjects. (Tables VII, VIII and IX, XX, XXI, and XXII). Because of the nature of these subjects there was a marked difference in the numbers of pupils who retrogressed in scholarship and those whose marks remained the same. Table IX shows that the marks of 75 children remained stable and 60 improved (Table VII), while only three retrogressed in scholarship (Table VIII).

In all subjects there is an obvious tendency for the percentages of the subjects, mathematics, English, and non-

governing the amount of improvement, retrogression, and non-improvement in each case.

The numbers of children, whose scholarship in mathematics retrogressed was relatively small. Only 18 of the 139 cases receiving educational treatment retrogressed in scholarship (Table II, columns 8, 15, and 22). Three of these dropped two points, "C" to "I". They were children whose intelligence quotients were below 80 and they had also been transferred to different teachers.

Table III shows that the greatest numbers of pupils in all groups of hearing ability showed no improvement at all. Stability of marks were recorded in 69 out of 139 cases.

Defective hearing groups studying English showed the same relation to each class as in mathematics. That is, there were 55 children whose marks improved in scholarship, 19 who retrogressed and 61 showing no improvement at all. (Tables IV, V, and VI).

Perhaps the most noticeable changes in the three classifications of subjects were in the non-academic subjects. (Tables VII, VIII and IX, XX, XXI, and XXII). Because of the nature of these subjects there was a marked difference in the numbers of pupils who retrogressed in scholarship and those whose marks remained the same. Table IX shows that the marks of 75 children remained stable and 60 improved (Table VII), while only three retrogressed in scholarship (Table VIII).

In all subjects there is an obvious tendency for the percentages of the subjects, mathematics, English, and non-

Table 2. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Not Receiving Medical Attention, and Showing Different Amounts of Retrogression in Scholarship as Indicated by Their Marks in Mathematics.

Amounts of Retrogression Shown	Intelligence Quotient: 111 or above — Levels of Hearing Ability							90 - 110 — Levels of Hearing Ability							89 or less — Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "A" to "B"	1	1					2							0							0
From "B" to "C"							0	1	2	2				5					2		2
From "B" to "D"							0	1						1							0
From "C" to "D"							0							0		1					1
From "C" to "I"							0		1					1		1			1		2
From "D" to "I"							0							0			1		1		2
Total	1	1					2	2	3	2				7		2	1		4		7

Table 3. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, not Receiving Medical Attention, and Showing No Improvement in Scholarship as Indicated by Their Marks in Mathematics.

No Improvement as Shown by Marks	Intelligence Quotient: 111 or above — Levels of Hearing Ability							Intelligence Quotient: 90-110 — Levels of Hearing Ability							Intelligence Quotient: 89 or less — Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
"I" and "I"							0							0			1				1
"D" and "D"							0	1						1	3	5			3		11
"C" and "C"	2		1				3	4	13	10		1		28		5	6				11
"B" and "B"			1		1		2	2	1	1				4		1					1
"A" and "A"			1				1							0							0
Total	2	0	3	0	1	0	6	7	14	11	0	1	0	33	3	11	7	0	3	0	24

Table 5. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, not Receiving Medical Attention, and Showing No Improvement in Scholarship as Indicated by Their Marks in Mathematics.

No Improvement as Shown by Marks (1)	111 or above							80-110							80 or less						
	Levels of Hearing Ability							Levels of Hearing Ability							Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
"I" and "I"							0							0			1				1
"D" and "D"							0	1						1	8	5			3		17
"C" and "C"	2		1				3	4	13	10		1		28		5	6				11
"B" and "B"			1		1		2	2	1	1				4		1					1
"A" and "A"			1				1							0							0
Total	2	0	3	0	1	0	6	7	14	11	0	1	0	33	8	11	7	0	3	0	24

Table 4. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, not Receiving Medical Attention, and Showing Different Amounts of Improvement in Scholarship as Indicated by Their Marks in English.

Amounts of Improvement Shown	Intelligence Quotient: 111 or above — Levels of Hearing Ability							90 - 110 — Levels of Hearing Ability							89 or less — Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "I" to "D"							0							0			1		2		3
From "I" to "B"							0	1						1							0
From "D" to "C"							0		1					1		1					1
From "D" to "B"							0							0		1					1
From "C" to "B"		2	4		1		7	5	13	8		1		27	1	6	2		1		10
From "C" to "A"		2					2		1					1							0
From "B" to "A"	1	2	1				4							0							0
Total	1	6	5	0	1	0	13	6	15	8	0	1	0	30	1	8	3	0	3	0	15

Table 5. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Not Receiving Medical Attention, and Showing Different Amounts of Retrogression in Scholarship as Indicated by Their Marks in English.

Amounts of Retrogression Shown	Intelligence Quotient: 111 or above — Levels of Hearing Ability							90 - 110 — Levels of Hearing Ability							89 or less — Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "A" to "B"		1					1			1				1							0
From "A" to "C"							0							0			1				1
From "B" to "C"							0	1	3	3				7		2					2
From "B" to "I"							0			1				1							0
From "C" to "D"							0							0					1		1
From "C" to "I"							0			2				2					1		1
From "D" to "I"			1				1							0		1					1
Total	0	1	1	0	0		2	1	3	7	0	0	0	11	0	3	1	0	2	0	6

Table 5. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Not Receiving Medical Attention, and Showing Different Amounts of Retrogression in Scholarship as Indicated by Their Marks in English.

Amounts of Retrogression Shown	Intelligence Quotient																					
	111 or above						90 - 110						89 or less									
	Levels of Hearing Ability						Levels of Hearing Ability						Levels of Hearing Ability									
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "A" to "B"		1					1				1			1								0
From "A" to "C"							0							0			1					1
From "B" to "C"							0		1	3				4			2					2
From "B" to "I"							0			1				1								0
From "C" to "D"							0							0					1			1
From "C" to "I"							0			2				2					1			1
From "I" to "I"			1				1							0			1					1
Total	0	1	1	0	0		2	1	1	3	7	0	0	0	11	0	3	1	0	2	0	6

Table 6. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Not Receiving Medical Attention, and Showing No Improvement in Scholarship as Indicated by Their Marks in English.

No Improvement as Shown by Marks	Intelligence Quotient: 111 or above — Levels of Hearing Ability							90-110 — Levels of Hearing Ability							89 or less — Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
"I" and "I"							0							0			1				1
"D" and "D"							0							0					2		2
"C" and "C"	1		1				2	5	10	4		1		20	5	13	8		4		30
"B" and "B"					1		1	3	1	1				5							0
Total	1	0	1	0	1	0	3	8	11	5	0	1	0	25	5	13	9	0	6	0	33

Table 6. Number of Pupils in Groups of Different Levels of Reading Ability, and Mental Ability, Not Receiving Special Instruction and Subsequent Improvement in Reading as Indicated by Later Tests.

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) |

academic, to become lower and lower as the hearing becomes more greatly impaired. This is shown by the comparison of the numbers and percentages in Tables X, XI, and XII. Greater improvement was noted in the first three groups in all subjects.

The children in the schools of this study have no opportunity to attend lip-reading classes unless they go to private schools for the hard-of-hearing. No public schools or classes to teach lip-reading have yet been established. The only educational treatment offered is the placement of the children in a vantage place in the classroom so that they may hear more easily, and the recommendation of those with serious defects for lip-reading classes. These, however, would have to be private classes.

The Commission on Education of the American Federation of Organizations for the Hard of Hearing reports the following happenings in some of the cities.[1]

> "In some cities a specially trained teacher goes from school to school giving instruction in speech reading, individually or to small groups of not more than six pupils as a rule. The periods range from 30 to 45 minutes each, and from once to four times a week. This has brought fruitful results. The child continues with his regular class, and he and his room teacher are intelligently advised of his needs, while his parents are better satisfied because he has not been marked as different and sent to a special school. Economically we find this to be sound, for in studies of figures we note that, while it costs $180.00 a year to educate a child in a special school, it cost in one city only $129.99 to educate him in this special class.

[1] The Hard of Hearing Child, School Health Studies No. 13. Pp.12-13

Table 7. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Not Receiving Medical Attention, and Showing Different Amounts of Improvement in Scholarship as Indicated by Their Marks in Non-academic Subjects.

Amounts of Improvement Shown	Intelligence Quotient: 111 or above — Levels of Hearing Ability							90 - 110 — Levels of Hearing Ability							89 or less — Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "3" to "2"							0		1					1	1	1	1				3
From "2" to "1"	1	5	5	0	2	0	13	5	13	13	0	1	0	32	2	8			1		11
Total	1	5	5	0	2	0	13	5	14	13	0	1	0	33	3	9	1	0	1	0	14

Table 7. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Not Receiving Medical Attention, and Showing Different Amounts of Improvement in Scholarship as Indicated by Their Marks in Non-academic Subjects.

Intelligence Quotient

Amounts of Improvement shown (1)	111 or above						90 - 110						89 or less					
	Levels of Hearing Ability						Levels of Hearing Ability.						Levels of Hearing Ability					
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "g" to "h"							0			I				I	I	I					3
From "g" to "l"	I	5	5	0	2	0	13	5	13	0	15	0	1	0	32	2	8			I		11
Total	I	5	5	0	2	0	13	5	14	0	15	0	1	0	35	3	9	1	0	1	0	14

Table 8. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Not Receiving Medical Attention, and Showing Different Amounts of Retrogression in Scholarship as Indicated by Their Marks in Non-academic Subjects.

Amounts of Retrogression Shown	Intelligence Quotient: 111 or above — Levels of Hearing Ability							90 - 110 — Levels of Hearing Ability							89 orless — Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "1" to "2"					1		1		1					1							0
From "2" to "3"							0							0		1					1
Total	0	0	0	0	1	0	1	0	1	0	0	0	0	1	0	1	0	0	0	0	1

Table 8. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Not Receiving Medical Attention, and Showing Different Amounts of Retrogression in Scholarship as Indicated by Their Marks in Non-academic Subjects.

Amount of Retrogression Shown (1)	Intelligence Quotient: 111 or Above							90 - 110							88 or Less						
	Levels of Hearing Ability							Levels of Hearing Ability							Levels of Hearing Ability						
	I (2)	II (3)	III (4)	IV (5)	V (6)	VI (7)	Total (8)	I (9)	II (10)	III (11)	IV (12)	V (13)	VI (14)	Total (15)	I (16)	II (17)	III (18)	IV (19)	V (20)	VI (21)	Total (22)
From "1" to "2"					1		1		1					1							0
From "2" to "3"						0	0							0		1					1
Total	0	0	0	0	1	0	1	0	1	0	0	0	0	1	0	1	0	0	0	0	1

Table 9. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Not Receiving Medical Attention, and Showing No Improvement in Scholarship as Indicated by Their Marks in Non-academic Subjects.

No Improvement as Shown by Marks	Intelligence Quotient																		
	111 or above							90 - 110							89 or less						
	Levels of Hearing Ability							Levels of Hearing Ability							Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
"1" and "1"		2	1				3							0							0
"2" and "2"	1		1				2	10	14	7		2		33	3	14	12	0	8	0	37
Total	1	2	2	0	0	0	5	10	14	7	0	2	0	33	3	14	12	0	8	0	37

Table 10. Comparison of Numbers and Percentages of Pupils in Groups of Different Levels of Hearing Ability, not Receiving Medical Attention, Showing Improvement in Mathematics, English, and Non-academic Subjects

Groups of Different Levels of Hearing Ability	Mathematics		English		Non-academic Subjects	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6(	(7)
I	23	.16	8	.05	9	.06
II	19	.13	29	.21	28	.20
III	14	.10	16	.11	19	.13
IV	0	.00	0	.00	0	.00
V	3	.02	5	.03	4	.03
VI	0	.00	0	.00	0	.00
Totals	59	.42	58	.42	60	.43

Table 10. Comparison of Numbers and Percentages of Pupils in Groups of Different Levels of Hearing Ability, not Receiving Medical Attention, Showing Improvement in Mathematics, English, and Non-academic Subjects

Groups of Different Levels of Hearing Ability	Mathematics		English		Non-academic Subjects	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I	25	.18	8	.05	9	.06
II	19	.13	29	.21	28	.20
III	14	.10	16	.11	19	.13
IV	0	.00	0	.00	0	.00
V	3	.02	6	.04	4	.03
VI	0	.00	0	.00	0	.00
Totals	59	.42	59	.42	60	.43

Table 11. Comparison of Numbers and Percentages of Pupils in Groups of Different Levels of Hearing Ability, not Receiving Medical Attention, Showing Retrogression in Mathematics, English, and Non-academic Subjects

Groups of Different Levels of Hearing Ability	Mathematics		English		Non-academic Subjects	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I	3	2	1	.07	0	0
II	6	4	7	5	2	1
III	3	2	9	6	0	0
IV	0	0	0	0	0	0
V	4	3	2	1	1	.07
VI	0	0	0	0	0	0
Totals	16	11	19	13	3	2

Table 11. Comparison of Numbers and Percentages of Pupils in Groups of Different Levels of Hearing Ability, not Receiving Medical Attention, Showing Retrogression in Mathematics, English, and Non-academic Subjects

Groups of Different Levels of Hearing Ability	Mathematics		English		Non-academic Subjects	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I	5	3	1	.07	0	0
II	9	4	7	5	2	1
III	3	2	9	6	0	0
IV	0	0	0	0	0	0
V	4	3	2	1	1	.07
VI	0	0	0	0	0	0
Totals	15	11	19	13	3	2

Table 12. Comparison of Numbers and Percentages of Pupils in Groups of Different Levels of Hearing Ability, not Receiving Medical Attention, Showing no Improvement in Mathematics, English, and Non-academic Subjects

Groups of Different Levels of Hearing Ability	Mathematics		English		Non-academic Subjects	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I	11	7	14	10	14	10
II	26	18	23	16	30	22
III	21	15	16	11	21	15
IV	0	0	0	0	0	0
V	5	3	8	5	10	7
VI	0	0	0	0	0	0
Totals	63	44	61	44	75	62

Table 12. Comparison of Numbers and Percentages of Pupils in Groups of Different Levels of Hearing Ability, not Receiving Medical Attention, Showing no Improvement in Mathematics, English, and Non-academic Subjects

Groups of Different Levels of Hearing Ability	Mathematics		English		Non-academic Subjects	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I	11	7	14	10	14	10
II	26	18	25	18	30	22
III	21	15	16	11	21	15
IV	0	0	0	0	0	0
V	5	3	8	5	10	7
VI	0	0	0	0	0	0
Totals	63	44	61	44	75	52

"In one large school it was found best to organize a special class with a speech-reading teacher in charge of instruction in all studies. There was a mixed grade of 5B and 3A, consisting of 25 pupils. They had half an hour of speech-reading each day, in classes of 12, all other grade subjects being handled as usual. The time for the special instruction was taken from music and drawing periods."

"Some school systems allow one teacher for each ten children needing special instruction of any kind. If then 8 children are found, some of whom are deaf and some hard of hearing, let a class be organized and the one teacher allotted be put in charge. The class will undoubtedly grow and, when there are more than 10 children, the class can be separated and the second teacher may take the deaf, and the other the hard of hearing."

"Children who have some hearing defect, but have normal speech, should be educated in the environment, of hearing children and not in a school for the deaf, where they are apt to acquire the voice and enunciation of the wholly deaf child."

"As soon as hard-of-hearing children, whether in special classes or special schools, acquire enough facility in speech reading to follow class room instruction (if placed in proper relation to the teacher and the light), they would be returned to full-time regular classes."[1]

Waldman, Wade and Aretz[2] in their book, "Hearing and The School Child" say:

"From a social point of view speech-reading is an essential in the education of the partially deafened child. Given instruction in speech-reading, the hard-of-hearing child may be treated as a hearing child. He should be treated as such and not segregated because of his instruction in speech-reading. This is simply an additional subject in the educational curriculum - the art of understanding what is said by watching the lips of the person speaking.

"The acquisition of speech-reading ability provides the hard-of-hearing, the deaf, and the deafened with a substitude which frequently gives him an actual feeling of superiority to counteract the repressing emotional effects caused by impaired hearing. Nothing can take the place of hearing, but

[1] The Hard of Hearing Child, Schools Health Studies No. 13. Pp. 12-13.

[2] Waldman, Wade, and Aretz - Pp. 186-187

"In one large school it was found best to organize a special class with a speech-reading teacher in charge of instruction in all studies. There was a mixed grade of 35 and 36, consisting of 25 pupils. They had half an hour of speech-reading each day. In classes of 15, all other grade subjects being handled as usual. The time for the special instruction was taken from music and drawing periods."

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speech-reading is the best aid for the deafened person. The part that vision plays to help defective hearing is in line with nature's compensatory law. Speech-reading thus, in many cases, affords a means of rehabilitation."

The educational value of teaching speech-reading to those with impaired hearing is immeasurable. Because of the progressive nature of many hearing defects, one can never tell when the impairment may become greater.

The failure to provide education for children with defective hearing may prove dangerous, as is shown by Peck, Samuelson, and Lehman in their book, "Ears and the Man." They say:

> "It is no uncommon occurrence today to find a very young child in the elementary school who has sat at a desk serving term after term in one grade, or who has been relegated to an ungraded class because of seeming stupidity. Hearing and psychological tests would immediately reveal an impairment of hearing and not mental shortcoming. The children are on the boundary line between a wholesome mental growth through education, or condemnation to social failure through neglect. A few hours a week of lip-reading instruction is all that is necessary to rescue them. Deprivation of development through education means a great human loss, and is ultimately more costly to the state than the inclusion of lip-reading instruction in the school program as a regular subject for deafened children."
>
> "While the acquisition of lip-reading knows no limitations of age or mentality, it frequently comes into our lives too late to serve when it is most needed. The lad about to graduate from school consults the educational adviser about the alternative of an occupation or the selection of a high school course. Baffled by his slight deafness she is sincere in her recommendations against the latter. She is equally certain that vocational training would be difficult under the circumstances, and that most occupations would be impossible because of deafness. The advice invariably is, in

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consequence, 'Go to work'. The young fellow acts upon this advice because he is at a loss to determine a better course for himself. The vocational counsellor, meanwhile, has performed her duty in the case to the best of her ability, with the resources at her command, but such disposition does not exonerate the school authorities for neglecting to establish the machinery for the satisfactory equipment of this boy for life. Commencing at this juncture a story of 'Ifs' can be built":

"If the lad had received lip-reading instruction in his elementary school at the onset of his deafness, he would not have fallen behind in his studies."

"If he had not fallen behind in his studies, his failing ears being helped by sight, he would have been eligible for higher education, and would have worked out his own salvation as a matter of course."

"If on the other hand the original need in his education, namely lip-reading in childhood, had been overlooked, the school should have been prepared to offer him lip-reading instruction as pre-vocational training."

"If this had been the case his vocational problem would have been as simple as that of children with normal hearing, and the boy would not have been thrust upon the world an economic dead weight, to return to the schools again in another guise, but no less a burden."

"If the lad had had the bond of communication between himself and his fellowmen established by lip-reading, he would not have resented attendance at continuation school to such an extent that he developed a resentful attitude towards all his intimates and to the restrictions imposed upon him by law."

"If, even at this late stage, the continuation school had offered him lip-reading instruction instead of (to his idea) a form of penal servitude of four hours a week sitting in an atmosphere of apparent activity in which he could not participate and which to him was actual nothingness, he would have been on the roster of faithful, creditable citizens

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instead of a deficient, law breaking enemy of society."

"If adequate provision, which is the right of every child, were an integral part of our schools, the cost of education would be greatly decreased. In other words,

"If the inalienable right of the individual to an opportunity for his fullest development through proper education is to be denied, the community must bear the brunt of costly mis-education, neglect, and wasted man-power."[1]

2. Summary

The results of this part of the study show, with the meager educational treatment given, a noticeable amount of improvement. The value of being able to send these children with defective hearing to lip-reading classes each week would no doubt be great. Previous studies in schools where children have been offered all of these opportunities, show a greater amount of progress than is noted here.

[1] A. Peck, E. Samuelson, and Ann Lehman, Ears and the Man. F.A. Davis, Philadelphia, 1926. Pp. 100-112.

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[1] A. Peck, E. Samuelson, and Ann Lehman, Ears and the Man. P.A. Davis, Philadelphia, 1928. Pp. 100-112.

CHAPTER III

THE CONDITIONS WHICH EXIST WHEN EDUCATIONAL AND MEDICAL TREATMENT IS GIVEN TO A GROUP OF CHILDREN WITH DEFECTIVE HEARING

1. Groups Receiving Educational and Medical Treatment

This section of the study endeavors to determine the improvement, retrogression, and non-improvement in scholarship of children who were offered the opportunities of educational treatment, and also received medical treatment. The educational treatment given was the same as described in the foregoing chapter. Medical treatment is herewith described.

Those who went to the otologist for treatment underwent the following examination. A careful check-up was made to find out if the defect was temporary or permanent. Then, if the trouble was such that the hearing would improve under treatment, it was noted. If it was found that the child should have instruction in lip-reading, this was recorded on a card (Appendix) which was sent to the school doctor. The following questions were answered by the otologist:

Is defect probably temporary or permanent?

Will hearing probably improve under treatment?

Should pupil have instruction in lip-reading?

On the reverse side of the card were blank spaces for any remarks which the otologist cared to make. (Appendix)

Many different types of ailments were revealed by this examination. They ranged all the way from impacted wax

CHAPTER III

THE CONDITIONS WHICH EXIST WHEN EDUCATIONAL AND MEDICAL TREATMENT IS GIVEN TO A GROUP OF CHILDREN WITH DEFECTIVE HEARING

1. Groups Receiving Educational and Medical Treatment

This section of the study endeavors to determine the improvement, retrogression, and non-improvement in scholarship of children who were offered the opportunities of educational treatment, and also received medical treatment. The educational treatment given was the same as described in the foregoing chapter. Medical treatment is herewith described.

Those who went to the otologist for treatment underwent the following examination. A careful check-up was made to find out if the defect was temporary or permanent. Then, if the trouble was such that the hearing would improve under treatment, it was noted. If it was found that the child should have instruction in lip-reading, this was recorded on a card (Appendix) which was sent to the school doctor. The following questions were answered by the otologist:

Is defect probably temporary or permanent?

Will hearing probably improve under treatment?

Should pupil have instruction in lip-reading?

On the reverse side of the card were blank spaces for any remarks which the otologist cared to make. (Appendix)

Many different types of ailments were revealed by this examination. They ranged all the way from impacted wax

to nerve deafness. The most common trouble seemed to be impacted wax, and when this was cleared a retest revealed normal hearing. The need for the removal of tonsils and adenoids was great. This seemed to be a most important factor in clearing up hearing difficulties. Dr. Jay N. Fishbein reports that:

> "The tonsils and adenoids should be given every consideration in the treatment of deafness. The tonsils should be carefully palpated and, if there is any evidence of purulent secretion, they should be removed before attempting any treatment of the ears. Tonsils contribute to deafness, both by the local effect on the adjacent tissues which govern intratympanic pressure, and by the indirect effect upon the auditory nerve. Particularly is this true in deafness of children."[1]

Other more serious ailments were abscessed ear operations, catarrh, nerve deafness, mastoid operations, diseased ear drum, and running ear. Some of these ailments resulted in permanent deafness.

There can be no doubt that medical treatment is a vital factor governing the progress of the school child with defective hearing.

Helen M. Collins in her report, "The 4-A Audiometer and the C.W.A. in Florida" states:

> "Approximately 2,754 children have been tested. Of this number 346 have had special investigations. A majority of those investigated indicate a definite casual factor which can be either removed or remedied by medical treatment. Health histories of the children show that abscesses, infected tonsils, and adenoids, and severe colds occur more frequently among those children with a greater hearing loss." [2]

[1]Dr. J. N. Fishbein, "A Study of Deafness," The Rhode Island Medical Journal, May 1933, P. 16.

[2]H. M. Collins, "The 4-A Audiometer and the C.W.A. in Florida" Volta Review, May 1935, Pp. 294-295.

to nerve deafness. The most common trouble seemed to be impacted wax, and when this was cleared a retest revealed normal hearing. The need for the removal of tonsils and adenoids was great. This seemed to be a most important factor in clearing up hearing difficulties. Dr. Jay M. Fishbein reports that:

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Other more serious ailments were discovered during operations, catarrh, nerve deafness, mastoid operations, diseased ear drum, and running ear. Some of these ailments resulted in permanent deafness.

There can be no doubt that medical treatment is a vital factor governing the progress of the school child with defective hearing.

Helen M. Collins in her report, "The 4-A Audiometer and the U.W.A. in Florida" states:

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[1] Dr. J. M. Fishbein. "A Study of Deafness," The Rhode Island Medical Journal, May 1935, p. 16.

[2] H. M. Collins, "The 4-A Audiometer and the U.W.A. in Florida" Volta Review, May 1935. pp. 294-296.

When children with defective hearing receive both medical and educational treatment, the chances to improve in scholarship are far greater than those receiving only educational treatment. The number of cases where hearing ability and scholarship improved after impacted wax was removed, exceeded all others. This is only a minor ailment and can be treated readily by any otologist or physician. The results from it should be carefully noted.

The factors which enter into each case are innumerable as was noted before. Among those which we must consider when interpreting the study are attendance, intelligence, conduct, late entrance to school, time spent in studying lessons, likes and dislikes, ambition, and perseverance.

This study concerns only those with slight impairments in hearing, but scientific studies show that conditions which exist with those who are seriously deafened may be applied to those whose hearing is slightly impaired.

Starch[1] in his book, Educational Psychology, shows us that: "Goddard (1914) found deafness perceptibly associated with neuropathic taint."

> "It has been shown by Pintner and Paterson[2] (1916) that deaf children are fully three years behind normal children in learning the digit symbol test which, as given by them, does not depend upon the use of language."

> Day, Fusfeld, and Pintner[3] say that: "The later the 'age of deafness', the higher the child is likely to score on the educational test. Each year of hearing, after age one, seems to give a better chance for educational achievement. This must undoubtedly be connected with the language

[1]Starch, Educational Psychology, Macmillan Co., New York 1921. P.130
[2]Ibid.
[3]Day Fusfeld, and Pintner, A Survey of American Schools for the Deaf. American Annals of the Deaf, 1927, Vol. 72. P. 267

ability of the child. In hearing children speech begins at about 12 months, increasing rapidly thereafter. Each year of speaking and hearing gives the child a rapidly increasing vocabulary, such as the child born deaf cannot obtain."

"Children, who lost their hearing before the age of four or five, are very little, if at all, benefited as far as language ability is concerned." [1]

"The deaf child is not retarded either in intelligence or educationally, when the language element is entirely eliminated from the tests." [2]

Pintner states that: "The mental alertness of the deaf is about three years behind normal, but in educational achievement the 12-15 year old deaf child equals the 8-9 year old hearing child. Age of onset makes a difference in an educational test, but not on a non-language test, the proportion decreasing as onset is delayed." [3]

After the 58 cases who received medical treatment were analyzed, it was found that 38 of these improved in scholarship in mathematics (Table XIII), columns 18,15 and 22. This was significant because the relation of this to the total numbers of those treated medically was more than those receiving only educational treatment. Table XIV shows only cases whose scholarship in mathematics retrogressed. Three of these were lowered one point. The fourth case, which dropped two points, was a child whose intelligence quotient was 100, but had changed the type of mathematics he was taking. Algebra took the place of general mathematics, and this was probably the factor which entered in, because the hearing loss was not great. Sixteen of the 58 cases showed neither improvement nor retrogression (Table XV). The greatest number was five, and these were border line cases.

[1] R. Pintner and D.G. Paterson, A Measurement of the Language Ability of Deaf Children. Psychological Review, Vol. XXIII, P.435-436

[2] J.Drever and M.Collins, Performance Tests of Intelligence, Oliver and Boyd, Edinburgh, Scotland, 1928, P. 3.

[3] R. Pintner, "Mental Survey of the Deaf", Journal of Educational Psychology, Vol. 19, Pp. 145-151.

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1. Dreyer and K.Oslins. Performance Tests of Intelligence. Oliver and Boyd, Edinburgh, Scotland. 1926. P. 3.

2. R. Pintner, "Mental Survey of the Deaf". Journal of Educational Psychology. Vol. 19, pp. 145-151.

English and the non-academic subjects presented comparatively the same story. Thirty-two children, with impaired hearing, improved their scholarship in English. (Table XVI, columns 8, 15 and 22). Those with the higher intelligence quotient ratings showed improvement in the upper levels, that is "C" to "A" and "B" to "A", while those with lower intelligence quotients improved in the lower levels, "I" to "C", "D" to "C", and "C" to "B". Out of the 58 cases only one declined in English. This was the only subject that showed only one retrogressing in scholarship. The marks of this child were lowered in all of the subjects. The numbers of pupils showing no improvement in English were 25, compared to 16 in mathematics. (Table XIX).

No child, it was found, retrogressed in scholarship in non-academic subjects. Thirty-six showed improvement and 22 remained stable (Tables XVIII and XIX).

In comparing the three subjects, the writer found that the greatest improvement was shown in mathematics, (Tables XX, XXL, and XXII). The percentage of those retrogressing was found to be the greatest in mathematics, and the greatest percentage of those remaining stable, in English.

2. Summary

The tendency in all subjects is toward improvement. Groups of all levels of hearing ability showed improvement in mathematics, English, and non-academic subjects. While many factors other than impaired hearing may enter into the cases,

Table 13. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Receiving Medical Attention, and Showing Different Amounts of Improvement in Scholarship as Indicated by Their Marks in Mathematics.

Amounts of Improvement Shown	Intelligence Quotient: 111 or above — Levels of Hearing Ability							90 - 110 — Levels of Hearing Ability							89 or less — Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "I" to "D"							0							0			1				1
From "I to "C"							0							0			1				1
From "D" to "C"							0			1		1		2	1	1					2
From "C" to "B"	1				1		2	3	5	3	1	5	2	19		1	1		2	2	6
From "C" to "A"		1					1			1				1							0
From "B" to "A"		2					2		1					1							0
Total	1	3	0	0	1	0	5	3	6	5	1	6	2	23	1	2	3	0	2	2	10

Table 18. Numbers of pupils in groups of different level of mental ability and
their level of attainment in reading and spelling during Interval 1.
Results analysed by Chi-square test.

as indicated by their marks in mathematics.

Total for Low Ability Group	I	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Level of Attainment in Reading and Spelling	Level of Mental Ability																				No. of Pupils
	I	II	III	IV	V	VI	I	II	III	IV	V	VI	I	II	III	IV	V	VI		
1																					1
2													1								1
3																					0
4													1								1
5													1	1							2
6														1							1
7													1	1							2
8														1	1						2
9															1						1
10																					0
11																					0
12																					0
13																					0
14																					0
15																					0
16																					0
17																					0
18																					0
19																					0
20																					0
21																					0
22																					0
No. of Pupils	0	0	0	0	0	0	1	0	1	0	0	0	4	3	1	0	0	0	0	0	10

Table 14. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Receiving Medical Attention, and Showing Different Amounts of Retrogression in Scholarship as Indicated by Their Marks in Mathematics.

Amounts of Retrogression Shown	Intelligence Quotient: 111 or above — Levels of Hearing Ability							90 - 110 — Levels of Hearing Ability							Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "A" to "B"							0			1				1							0
From "B" to "C"							0		1			1		2							0
From "B" to "I"							0		1					1							0
Total	0	0	0	0	0	0	0	0	2	1	0	0	0	4	0	0	0	0	0	0	0

Table 14. Numbers of Pupils in Groups of Different Levels of Reading Ability and Mental Ability, Receiving Medical Attention, and Showing Different Amounts of Retrogression in Scholarship as Indicated by Their Marks in Mathematics.

Amounts of Retrogression Shown	Intelligence Quotient																					
	111 or above							90 - 110														
	Levels of Reading Ability							Levels of Reading Ability									Levels of Hearing Ability					
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "A" to "B"							0			1				1								0
From "B" to "C"							0		1			1		2								0
From "B" to "I"							0		1					1								0
Total	0	0	0	0	0	0	0	0	2	1	0	0	0	4	0	0	0	0	0	0	0	0

Table 15. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Receiving Medical Attention, and Showing No Improvement in Scholarship as Indicated by Their Marks in Mathematics.

No Improvement as Shown by Marks	Intelligence Quotient																						
	111 or above							90 - 110							89 or less								
	Levels of Hearing Ability							Levels of Hearing Ability							Levels in Hearing Ability								
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)		
"D" and "D"							0							0	1	1					2		
"C" and "C"			1				1	3	2	1		2		8	1		1	1	1		4		
"A" and "A"							0			1				1							0		
Total	0	0	1	0	0	0	1	3	2	2	0	2	0	9	2	1	1	1	1	0	6		

Table 15. Number of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Receiving Medical Attention, and Showing No Improvement in Scholarship as Indicated by Their Marks in Mathematics.

No Improvement as Shown by Marks	Intelligence Quotient																					
	111 or above							90 - 110							89 or less							
	Levels of Hearing Ability							Levels of Hearing Ability							Levels in Hearing Ability							
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	
"D" and "D"							0							0	1					1		2
"C" and "C"			1				1	3	2	1		2		8	1			1	1	1		4
"A" and "A"							0			1				1								0
Total	0	0	1	0	0	0	1	3	2	2	0	2	0	9	2	1	1	1	1	1	0	6

Table 16. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Receiving Medical Attention, and Showing Different Amounts of Improvement in Scholarship as Indicated by Their Marks in English.

Amounts of Improvement Shown	Intelligence Quotient: 111 or above — Levels of Hearing Ability							90 - 110 — Levels of Hearing Ability							89 or less — Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
From "I" to "C"							0					1		1	1						1
From "D" to "C"							0		1					1		1					1
From "C" to "B"	1		2		1		4	4	3	5	1	3	1	17			1	1	1	1	4
From "D" to "A"							0		1					1							0
From "B" to "A"							0		2					2							0
Total	1	0	2	0	1	0	4	4	7	5	1	4	1	22	1	1	1	1	1	1	6

Table 18. Number of Pupils in Grades of Different Levels of Learning Ability and Mental Ability, Selected Schools, Illustrating Differences and Changes of Improvement in School Ability as Indicated by Their Marks in Depth.

Amounts of Improvement Shown Work Habits (1)

Intelligence Quotient

All of above (2)

30 - 100

Levels of Learning Ability (3)

Total (4)

Levels of Learning Ability (5)

Total (6)

Level	1	2	3	4	5	6	7	8	9	10	11	12	13
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													

there is definite improvement in all groups shown.

there is definite improvement in all groups shown.

Table 17. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Receiving Medical Attention, and Showing No Improvement in Scholarship as Indicated by Their Marks in English.

No Improvement as Shown by Marks	Intelligence Quotient																						
	111 or above							90 - 110							89 or less								
	Levels of Hearing Ability							Levels of Hearing Ability							Levels of Hearing Ability								
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)		
"I" and "I"							0							0			1				1		
"D" and "D"							0							0					1		1		
"C" and "C"							0	2	2	1	1	5	1	12	1	2	1		1	1	6		
"B" and "B"		2					2							0							0		
"A" and "A"		1					1			1				1							1		
Total	0	3	0	0	0	0	3	2	2	2	1	5	1	13	1	2	2	0	2	1	9		

Table 17. Numbers of Pupils in Groups of different Levels of Hearing Ability and Mental Ability, Receiving Medical Attention, and Showing No Improvement in Scholarship as Indicated by Their Marks in Reading.

Intelligence Quotient

| No Improvement as Shown by Marks | Levels of Hearing Ability | | |

Table 18. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Receiving Medical Attention, and Showing Different Amounts of Improvement in Scholarship as Indicated by Their Marks in Non-academic Subjects.

Amounts of Improvement Shown	Intelligence Quotient																							
	111 or above							90 - 110							89 or less									
	Levels of Hearing Ability							Levels of Hearing Ability							Levels of Hearing Ability									
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)			
From "3" to "2"							0							0						1	1			
From "2" to "1"		2	2		1		5	4	5	3	2	6	1	21	1	3	1	1	2	2	9			
Total	0	2	2	0	1	0	5	4	5	3	2	6	1	21	1	3	1	1	2	2	10			

Table 19. Numbers of pupils in Groups of different levels of hearing ability and their visual ability, hearing ability and Snellen visual acuity in the better eye.

Selected medical attention and Snellen visual acuity in the better eye. Indicates significant improvement.

Pupils with Normal Hearing

| Pupils with Normal Hearing | | |

Table 19. Numbers of Pupils in Groups of Different Levels of Hearing Ability and Mental Ability, Receiving Medical Attention, and Showing No Improvement in Scholarship as Indicated by Their Marks in Non-academic Subjects.

No Improvement As Shown by Marks	Intelligence Quotient: 111 or above — Levels of Hearing Ability							90 - 110 — Levels of Hearing Ability							89 or less — Levels of Hearing Ability						
	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total	I	II	III	IV	V	VI	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
"1" and "1"	1	1					2		1	1				2							0
"2" and "2"							0	3	3	3		2	1	12	1	1	2		2		6
Total	1	1	0	0	0	0	2	3	4	4	0	2	1	14	1	1	2	0	2	0	6

Table 13. Numbers of Pupils in Groups of Different Levels of Reading Ability, Receiving Medical Attention, and Showing No Improvement in Scholarship as Indicated by Their Marks in Non-academic Subjects.

Intelligence Quotient

No Improvement As Shown by Marks (1)	110 or above						90 – 109						70 – 89						50 – 69					
	Levels of Reading Ability						Levels of Reading Ability						Levels of Reading Ability						Levels of Reading Ability					
	I	II	III	IV	V	VI	Total	(2)	I	II	III	IV	V	VI	Total	(2)	I	II	III	IV	V	VI	Total	(2)
"A" and "B"														1	1									
"B" and "C"													1	2	3									
"C" and "D"												1	1	3	5									
"D" and "E"											1	1	2	3	7									
"E" and "F"										1	1	2	3	4	11									
"F" and "G"									1	1	2	3	4	5	16									
Total									1	2	4	7	11	18	43									

Table 20. Comparison of Numbers and Percentages of Pupils in Groups of Different Levels of Hearing Ability, Receiving Medical Attention, Showing Improvement in Mathematics, English, and Non-academic Subjects

Groups of Different Levels of Hearing Ability	Mathematics		English		Non-academic Subjects	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I	5	9	6	10	5	9
II	11	19	8	14	10	17
III	7	12	8	14	6	10
IV	2	3	2	3	3	5
V	9	15	6	10	9	15
VI	4	7	2	3	3	5
Totals	38	65	32	55	36	62

Table 21. Comparison of Numbers and Percentages of Pupils in Groups of Different Levels of Hearing Ability, Receiving Medical Attention, Showing Retrogression in Mathematics, English, and Non-academic Subjects

Groups of Different Levels of Hearing Ability	Mathematics		English		Non-academic Subjects	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I	0	0	0	0	0	0
II	2	3	1	2	0	0
III	1	1	0	0	0	0
IV	0	0	0	0	0	0
V	1	2	0	0	0	0
VI	0	0	0	0	0	0
Totals	4	7	1	2	0	0

Table 21. Comparison of Numbers and Percentages of Pupils in Groups of Different Levels of Hearing Ability, Showing Retrogression in Mathematics, English, and Non-academic Subjects

Groups of Different Levels of Hearing Ability	Mathematics		English		Non-academic Subjects	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I	0	0	0	0	0	0
II	2	3	1	2	0	0
III	1	1	0	0	0	0
IV	0	0	0	0	0	0
V	1	2	0	0	0	0
VI	0	0	0	0	0	0
Totals	4	7	1	2	0	0

Table 22. Comparison of Numbers and Percentages of Pupils in Groups of Different Levels of Hearing Ability, Receiving Medical Attention, Showing no Improvement in Mathematics, English and Non-academic Subjects

Groups of Different Levels of Hearing Ability	Mathematics		English		Non-academic Subjects	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I	5	9	4	7	5	9
II	3	5	7	12	6	10
III	4	7	4	7	6	10
IV	1	2	1	2	0	0
V	3	5	7	12	4	7
VI	0	0	2	3	1	2
Totals	16	27	25	43	22	38

Table 22. Comparison of Numbers and Percentages of Pupils in Groups of Different Levels of Hearing Ability. Receiving Medical Attention, Showing no Improvement in Mathematics, English and Non-academic Subjects

Groups of Different Levels of Hearing Ability	Mathematics		English		Non-academic Subjects	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I	5	9	4	7	5	9
II	3	5	7	12	6	10
III	4	7	4	7	6	10
IV	1	2	1	2	0	0
V	3	5	7	12	4	7
VI	0	0	2	3	1	2
Totals	16	27	25	43	22	38

CHAPTER IV

COMPARISONS OF CHILDREN RECEIVING EDUCATIONAL TREATMENT AND THOSE RECEIVING EDUCATIONAL AND MEDICAL TREATMENT

1. Comparisons of Subjects

In order to determine the final results of the marks of children with impaired hearing, the writer decided to compare the percentages of those who showed improvement, retrogression, and showed no improvement.

Table XXIII shows that 16 per cent of those improving in mathematics were in Group I. As the hearing disability increased the chances of improvement became less. Groups II, III and V, column 2, show this.

The difference between those improving in scholarship and those retrogressing is significant. Two per cent in Group I retrogressed, four per cent in Group II, two per cent in Group III, and three per cent in Group IV.

Summaries show that 59 per cent of those taking mathematics, improved, 16 per cent retrogressed, and 63 per cent remained stable. The interesting note is that the greatest percentage of all fell in the group of children whose marks remained stable. This was found to be true in all subjects. (Tables XXIV and XXV).

The same results existed with those receiving medical and educational attention, the difference being that the percentages were greater in each group.

CHAPTER IV

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I. Comparisons of Subjects

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Table XXIII shows that 16 per cent of those improving in mathematics were in Group I. As the hearing disability increased the chances of improvement became less. Groups II, III and V, column 2, show this.

The difference between those improving in scholarship and those retrogressing is significant. Two per cent in Group I retrogressed, four per cent in Group II, two per cent in Group III, and three per cent in Group IV.

Summaries show that 39 per cent of those having mathematics, improved, 16 per cent retrogressed, and 83 per cent remained stable. The interesting note is that the greatest percentage of all fell in the group of children whose marks remained stable. This was found to be true in all subjects. (Tables XXIV and XXV).

The same results existed with those receiving medical and educational attention, the difference being that the percentages were greater in each group.

Table 23. Summary of Groups of Different Levels of Hearing Ability, Not Receiving Medical Attention, Showing Percentages of Those Whose Scholarship Improved, Retrogressed and Did Not Improve in Mathematics

Groups of Different Levels of Hearing Ability	Showed Improvement in Scholarship	Showed Retrogression in Scholarship	Showed No Improvement in Scholarship	Totals
	Percent	Percent	Percent	Percent
(1)	(2)	(3)	(4)	(5)
I	16	2	7	27
II	13	4	18	36
III	10	2	15	27
IV	0	0	0	0
V	2	3	3	9
VI	0	0	0	0
Totals	42	11	44	100

Table 23. Summary of Groups of Different Levels of Hearing Ability, Not Receiving Medical Attention, Showing Percentages of Those Whose Scholarship Improved, Retrogressed and Did Not Improve in Mathematics

Groups of Different Levels of Hearing Ability	Showed Improvement in Scholarship	Showed Retrogression in Scholarship	Showed No Improvement in Scholarship	Totals
	Percent	Percent	Percent	Percent
(1)	(2)	(3)	(4)	(5)
I	16	2	7	27
II	13	4	19	36
III	10	5	15	27
IV	0	0	0	0
V	2	3	3	9
VI	0	9	0	0
Totals	42	11	44	100

Table 24. Summary of Groups of Different Levels of Hearing Ability, not Receiving Medical Attention, Showing Percentage of Those Whose Scholarship Improved, Retrogressed, and Did Not Improve in English.

Groups of Different Levels of Hearing Ability	Showed Improvement in Scholarship Percent	Showed Retrogression in Scholarship Percent	Showed No Improvement in Scholarship Percent	Totals Percent
(1)	(2)	(3)	(4)	(5)
I	5	7/10	10	17
II	21	5	16	42
III	11	6	11	30
IV	0	0	0	0
V	3	1	5	11
VI	0	0	0	0
Totals	42	13	44	100

Table 24. Summary of Groups of Different Levels of Hearing Ability, not Receiving Medical Attention, Showing Percentage of Those Whose Scholarship Improved, Retrogressed, and Did Not Improve in English.

Groups of Different Levels of Hearing Ability	Showed Improvement in Scholarship	Showed Retrogression in Scholarship	Showed No Improvement in Scholarship	Totals
	Percent	Percent	Percent	Percent
(1)	(2)	(3)	(4)	(5)
I	5	7\10	10	17
II	21	5	16	42
III	13	6	11	30
IV	0	0	0	0
V	3	1	5	11
VI	0	0	0	0
Totals	42	19	44	100

Table 25. Summary of Groups of Different Levels of Hearing Ability, Not Receiving Medical Attention, Showing Percentages of Those Whose Scholarship Improved, Retrogressed and Did Not Improve in Non-academic Subjects.

Groups of Different Levels of Hearing Ability	Showing Improvement in Scholarship	Showing Retrogression in Scholarship	Showing No Improvement in Scholarship	Totals
	Percent	Percent	Percent	Percent
(1)	(2)	(3)	(4)	(5)
I	6	0	10	17
II	20	1	22	43
III	13	0	15	29
IV	0	0	0	0
V	3	7/10	7	11
VI	0	0	0	0
Totals	43	2	62	100

Sixty-five per cent improved in mathematics, seven per cent retrogressed, and 27 per cent remained stable (Table XXVI).

English results showed 55 per cent improving, one per cent retrogressing, and 43 per cent remaining stable (Table XXVII).

The percentages of the non-academic subjects proved to be higher than either of the other two. Sixty-two per cent showed improvement, 38 per cent remained stable, and there were none who retrogressed in scholarship (Table XXVIII).

Perhaps the comparisons show more significance in Tables XXIX and XXX. Here it was shown that mathematics and English were very closely related. Forty-two per cent improved in scholarship in both subjects, and 44 per cent remained stable. Eleven per cent retrogressed in mathematics, and 13 per cent retrogressed in English. The subjects, mathematics and English, seem to be more closely related in the groups who received educational treatment, than in those groups who received both educational and medical treatment. The probability is that the educational treatment given all groups was the same, whereas the type of medical treatment administered varied in practically every case.

The results of those receiving medical attention showed that 65 per cent improved in mathematics compared to 55 per cent in English. (Table XXX). Twenty-seven per cent remained stable in mathematics compared to 43 per cent in English.

Table 26. Summary of Groups of Different Levels of Hearing Ability, Receiving Medical Attention, Showing Percentages of Those Whose Scholarship Improved, Retrogressed, and Did Not Improve in Mathematics.

Groups of Different Levels of Hearing Ability	Showed Improvement in Scholarship Percent	Showed Retrogression in Scholarship Percent	Showed No Improvement in Scholarship Percent	Totals Percent
(1)	(2)	(3)	(4)	(5)
I	9	0	9	17
II	19	3	5	27
III	12	1	7	20
IV	3	0	1	5
V	15	1	5	22
VI	7	0	0	7
Totals	65	7	27	100

Table 26. Summary of Groups of Different Levels of Hearing Ability, Receiving Medical Attention, Showing Percentages of Those Whose Scholarship Improved, Heterogressed, and Did Not Improve in Mathematics.

Groups of Different Levels of Hearing Ability	Showed Improvement in Scholarship	Showed Heterogression in Scholarship	Showed No Improvement in Scholarship	Totals
	Percent	Percent	Percent	Percent
(1)	(2)	(3)	(4)	(5)
I	9	0	9	17
II	19	3	5	27
III	12	1	7	20
IV	3	0	1	5
V	15	1	5	22
VI	7	0	0	7
Totals	65	7	27	100

Table 27. Summary of Groups of Different Levels of Hearing Ability, Receiving Medical Attention, Showing Percentages of Those Whose Scholarship Improved, Retrogressed, and Did Not Improve in English.

Groups of Different Levels of Hearing Ability	Showed Improvement in Scholarship Percent	Showed Retrogression in Scholarship Percent	Showed No Improvement in Scholarship Percent	Totals Percent
(1)	(2)	(3)	(4)	(5)
I	10	0	7	17
II	14	1	12	27
III	14	0	7	20
IV	3	0	1	5
V	10	0	12	22
VI	3	0	3	7
Totals	55	1	43	100

Table 28. Summary of Groups of Different Levels of Hearing Ability, Receiving Medical Attention, Showing Percentages of Those Whose Scholarship Improved, Retrogressed, and Did Not Improve in Non-academic Subjects

Groups of Different Levels of Hearing Ability	Showed Improvement in Scholarship Percent	Showed Retrogression in Scholarship Percent	Showed No Improvement in Scholarship Percent	Totals Percent
(1)	(2)	(3)	(4)	(5)
I	9	0	9	18
II	17	0	10	27
III	10	0	10	20
IV	5	0	0	5
V	15	0	7	22
VI	5	0	1	7
Totals	62	0	38	100

Table 28. Summary of Groups of Different Levels of Hearing Ability, Receiving Medical Attention, Showing Percentages of Those Whose Scholarship Improved, Regressed, and Did Not Improve in Non-academic Subjects

Groups of Different Levels of Hearing Ability	Showed Improvement in Scholarship Percent	Showed Retrogression in Scholarship Percent	Showed No Improvement in Scholarship Percent	Totals Percent
(1)	(2)	(3)	(4)	(5)
I	9	0	9	18
II	17	0	10	27
III	10	0	10	20
IV	5	0	0	5
V	15	0	7	22
VI	5	0	1	7
Totals	62	0	38	100

Table 29. Numbers and Percentages of Pupils, Not Receiving Medical Attention, Showing Improvement, Retrogression, and No Improvement in Scholarship, Classified According to Subject.

Subject	Showing Improvement in Scholarship		Showing Retrogression in Scholarship		Showing No Improvement in Scholarship	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mathematics	59	42	16	11	63	44
English	58	42	19	13	61	44
Non-academic	60	43	3	2	75	62

Table 29. Numbers and Percentages of Pupils, Not Receiving Medical Attention, Showing Improvement, Retrogression, and No Improvement in Scholarship, Classified According to Subject.

Subject	Showing Improvement in Scholarship		Showing Retrogression in Scholarship		Showing No Improvement in Scholarship	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mathematics	59	42	16	11	65	44
English	58	42	19	13	61	44
Non-academic	60	43	3	2	75	52

Table 30. Numbers and Percentages of Pupils Receiving Medical Attention, Showing Improvement, Retrogression, and No Improvement in Scholarship, Classified According to Subject.

Subject	Showing Improvement in Scholarship		Showing Retrogression in Scholarship		Showing No Improvement in Scholarship	
	Number	Percent	Number	Percent	Number	Percent
Mathematics	38	65	4	7	16	27
English	32	55	1	1	25	43
Non-academic	36	62	0	0	22	38

Seven per cent showed retrogression in mathematics compared to one per cent in English.

The percentages in the non-academic subjects were slightly different. Forty-three per cent of those receiving no medical treatment showed improvement, two per cent retrogressed, and 62 per cent remained stable. Those receiving medical attention improved 62 per cent, none retrogressed, and 38 per cent remained stable.

In some cases improvement was shown in all subjects, while in others a child improved in the non-academic subjects and not in English and mathematics. Where some improvement was shown in one subject and not in another, the possibility of factors other than defective hearing entered in. Most of the cases showed either improvement in all subjects, or retrogression in all subjects.

A careful study of the tables in the chapter reveals that, whether the child received educational treatment or medical treatment, a considerable amount of improvement was shown. This may be shown more clearly in the graphs (Figures 1, 2, 3, 4, 5, and 6).

The outstanding feature of the analysis of the study was the unsuspected amount of improvement shown in all subjects. The percentages of those whose marks remained stable were believed at first would exceed those who improved but this, as was shown, was found not to be true.

Seven per cent showed retrogression in mathematics compared to one per cent in English.

The percentages in the non-academic subjects were slightly different. Forty-three per cent of those receiving no medical treatment showed improvement, two per cent retrogressed, and 65 per cent remained stable. Those receiving medical attention improved 85 per cent, none retrogressed, and 38 per cent remained stable.

In some cases improvement was shown in all subjects, while in others a child improved in the non-academic subjects and not in English and mathematics. Where some improvement was shown in one subject and not in another, the possibility of factors other than defective hearing entered in. Most of the cases showed either improvement in all subjects, or retrogression in all subjects.

A careful study of the tables in the chapter reveals that, whether the child received educational treatment or medical treatment, a considerable amount of improvement was shown. This may be shown more clearly in the graphs (Figures 1, 2, 3, 4, 5, and 6).

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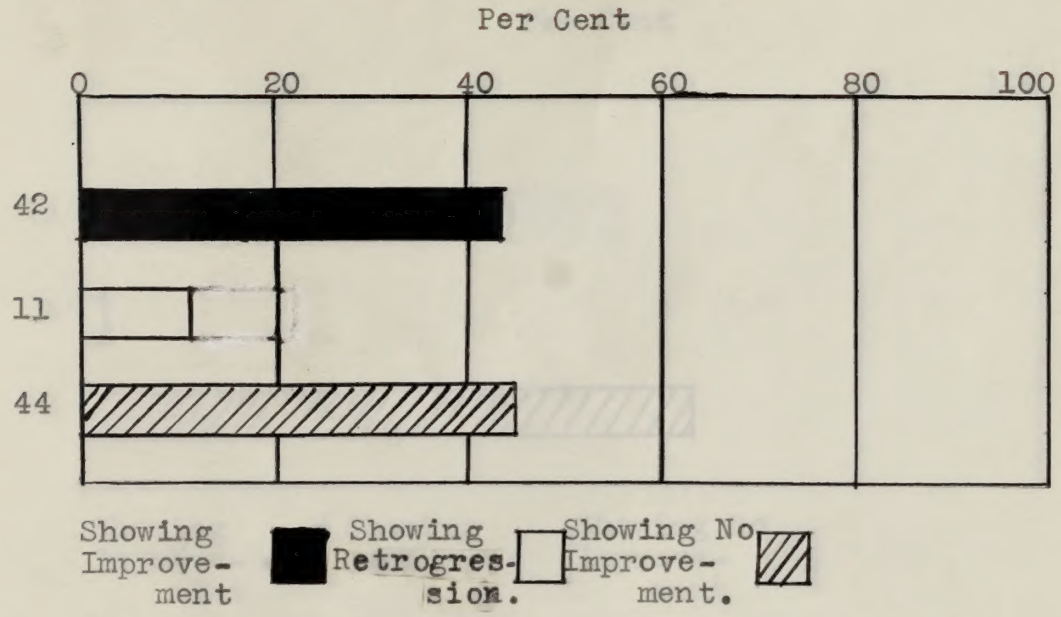


Figure 1. Percentages of Pupils Not Receiving Medical Attention, Showing Those Whose Scholarship Improved, Retrogressed and Remained Stable in Mathematics.

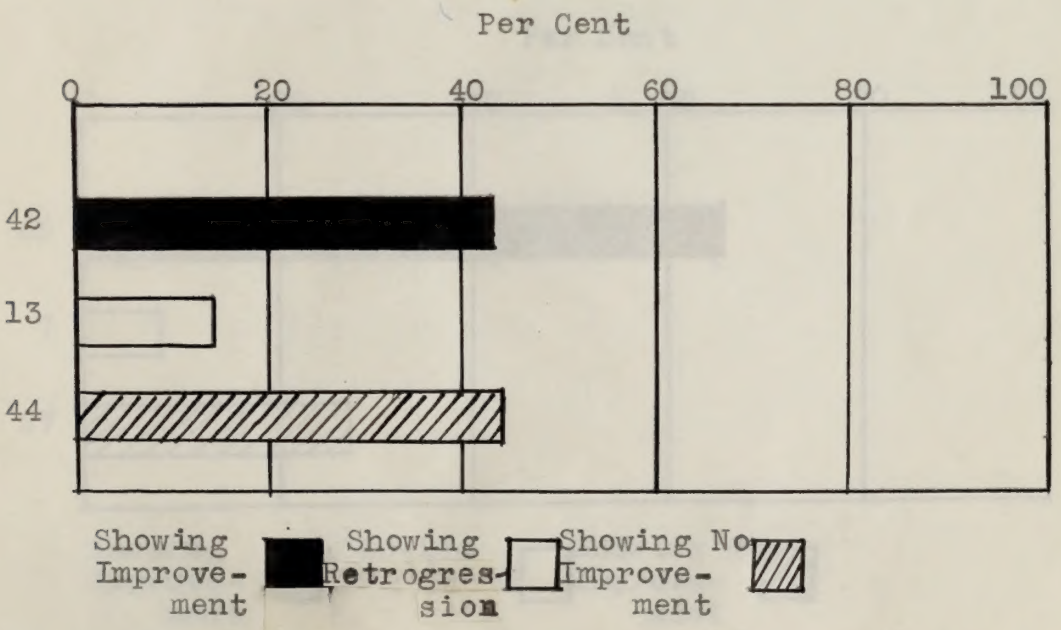
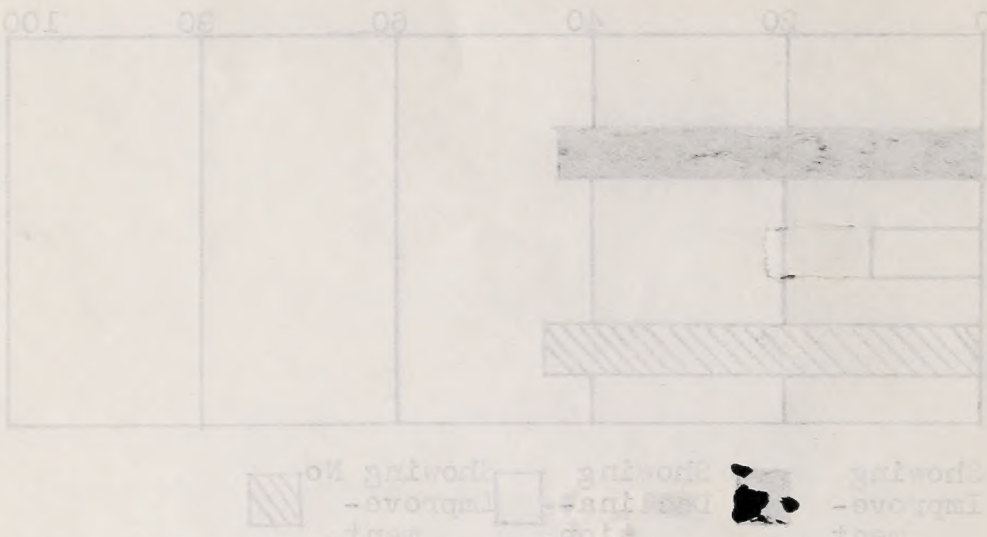


Figure 2. Percentages of Pupils Not Receiving Medical Attention, Showing Those Whose Scholarship Improved, Retrogressed and Remained stable in English.



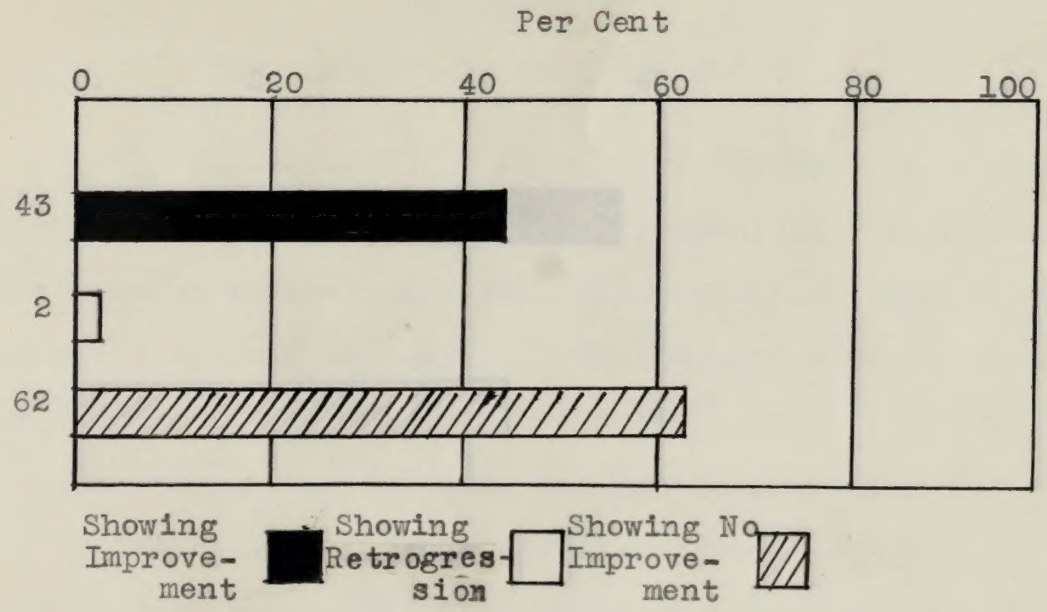


Figure 3. Percentages of Pupils Not Receiving Medical Attention, Showing Those Whose Scholarship Improved, Retrogressednd Remained Stable, in Non-Academic Subjects.

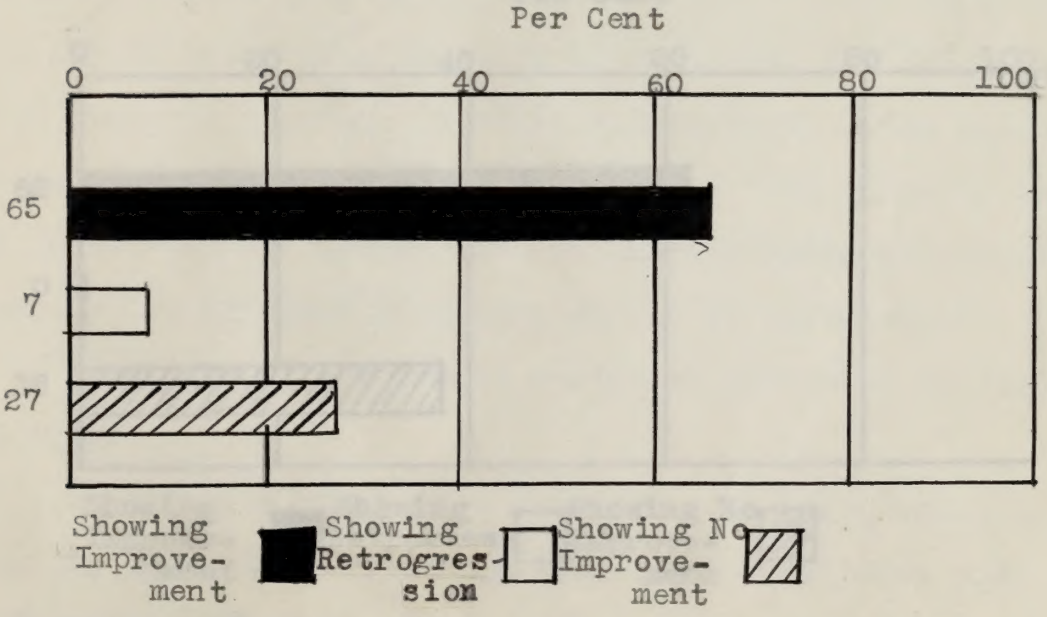
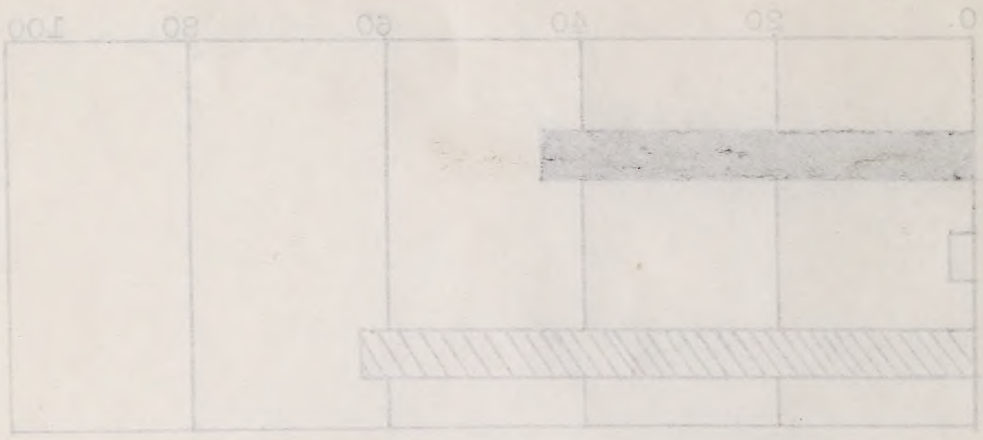


Figure 4. Percentages of Pupils Receiving Medical Attention, Showing Those Whose Scholarship Improved, Retrogressed, and Remained Stable in Mathematics.


0
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42
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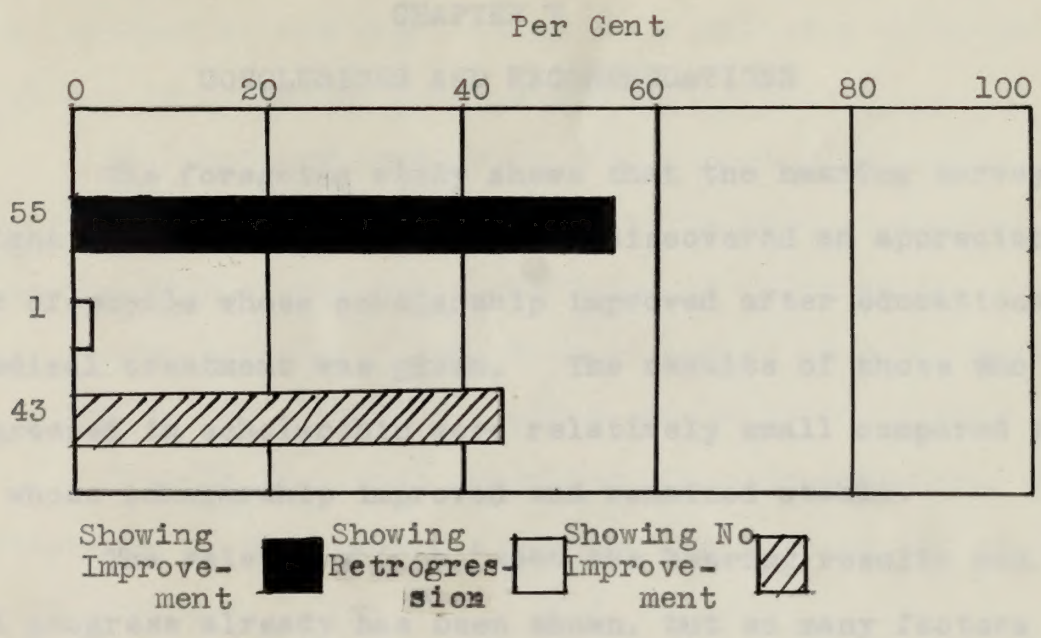


Figure 5. Percentages of Pupils Receiving Medical Attention, Showing Those Whose Scholarship Improved, Retrogressed, and Remained Stable in English.

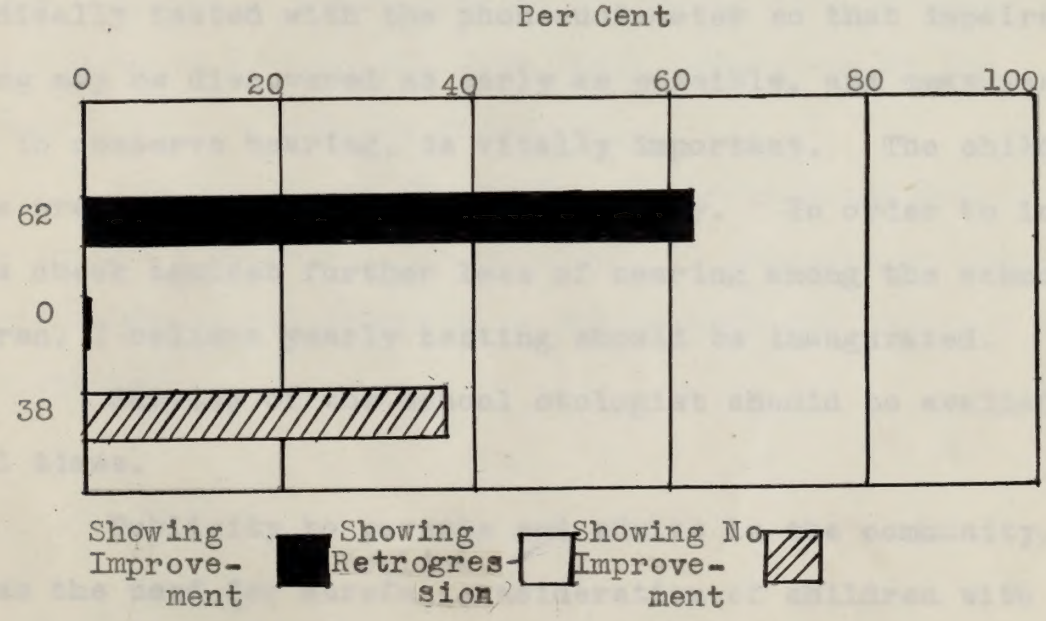
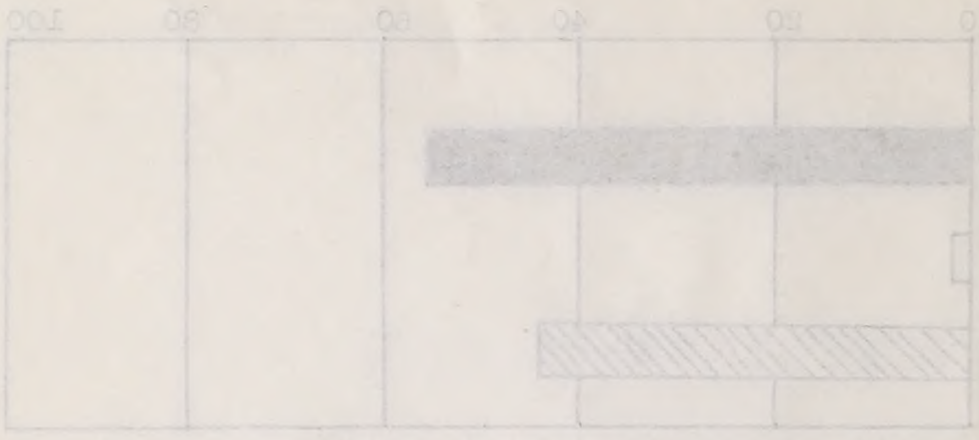


Figure 6. Percentages of Pupils Receiving Medical Attention, Showing Those Whose Scholarship Improved, Retrogressed, and Remained Stable in Non-Academic Subjects



CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The foregoing study shows that the hearing survey of the eight public junior high schools discovered an appreciable number of pupils whose scholarship improved after educational and medical treatment was given. The results of those who retrogressed in scholarship were relatively small compared to those whose scholarship improved and remained stable.

The relationship between the hearing results and school progress already has been shown, but so many factors other than defective hearing were prominent that the relationship was comparatively small.

The necessity of having the hearing acuity of children periodically tested with the phonoaudiometer so that impaired hearing may be discovered as early as possible, and measures taken to conserve hearing, is vitally important. The children, at the present time, are not tested yearly. In order to insure a check against further loss of hearing among the school children, I believe yearly testing should be inaugurated.

Service of the school otologist should be available at all times.

Publicity to parents and adults in the community, to impress the need for careful consideration of children with impaired hearing, would be advantageous.

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Service of the school otologist should be available at all times.

Publicity to parents and adults in the community, to impress the need for careful consideration of children with impaired hearing, would be advantageous.

The importance of the establishment of lip-reading classes, similar to the sight conservation classes which we now have, should be impressed upon school officials.

At least one teacher in each school ought to be trained in lip-reading methods, so that the hard-of-hearing child may be sent to her for instruction in lip-reading.

More detailed description of how to help the deafened child, given to the classroom teacher, would be invaluable.

Hearing is a most important sense in education, and more attention to this matter should no doubt raise the level of school progress.

This study of hearing and the improvement of scholarship, shows that educational and medical treatment administered does tend to help the child to progress in his school subjects. It shows the need for more careful follow-up work of those with impaired hearing so that all will avail themselves of the opportunity to have medical treatment.

The purpose of the study will be accomplished if all of the possible opportunities which can be obtained to help the hard-of-hearing child progress in scholarship are put into the school system.

A P P E N D I X

APPENDIX

Figure 1. Sample of card used to record data.

Smith, Albert (25 Highland Avenue)

I.Q.	Age	Sex	Grade	R.ear Hear	L.ear Loss	History
100	14	M	9B	15	0	Running ear

Medical Received - Examination showed hearing temporary - hearing would improve under treatment, no need for lip-reading classes.

	Improvement		Declination		No Improvement	
	Beginning	End	Beginning	End	Beginning	End
Math.	C	A				
Eng.	C	B				
Non-Ac.	2	1				

Figure 2. Report Card Used in the Study.

PUPIL'S REPORT CARD

- - - - Junior High School

Name _____

Home Room _____ Grade _____

Cumulative Subjects	1st Q	Term
English		
Mathematics		
Latin		
French		
Non-Cumulative or Exploratory		
Social Science		
General Science		
Junior Business Training		
Penmanship		
Spelling		
Typewriting		
Home Economics		
Woodworking		
Metal		
Machine		
Printing		
Drafting		
Free Hand Drawing		
Health		
Auditorium		
Occupational Civics		
Music		
Dramatics		
Citizenship		
Days Absent		
Times Late		
Times Dismissed		

(over)

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Metal		
Machine		
Printing		
Crafting		
Free Hand Drawing		
Health		
Auditorium		
Occupational Civics		
Music		
Dramatics		
Citizenship		
Days Absent		
Times Late		
Times Dismissed		

(over)

Figure 3. Reverse Side of Report Card Used in the Study

Parent's Signature

1st Quarter

Term

Parents are cordially invited to visit the school and consult the teacher in regard to the welfare and progress of their children.

EXPLANATION OF MARKS

Subjects marked by letters are basic subjects for the grade in which the pupil is studying.
A - excellent, B- good, C - passed, D - conditional
I - incomplete.

Work marked I must be completed before the pupil can be promoted to the next higher class.

Subjects marked by figures are exploratory in character and indicate the pupil's aptitude for the kind of work marked.

1 - Aptitude of considerable degree.
2.- Aptitude of fair degree.
3 - Little or no aptitude.

Figure 3. Reverse Side of Report Card Used in the Study

Figure 4. Sample of List of Pupils Sent to Principals

Report on Audiometer Tests for
Hearing at
Nathaniel Greene Junior High School

Enrolled	1443	
Tested	1340	
1st retest	202	(Pupils below normal January 4, 1934)
2nd retest	46	
Defective	38	

Name	Address	Age	Sex	Grade	Hear-Loss R.	L.	History
1. Adams, Joseph	52 Washington St.	14	M	7A	3	18	Noise T*
2. Brown, James	38 Vermont Ave.	12	M	7B	18	27	Aches-Runs - Noise T
3. Darling, Alice	19 Clyde St.	15	F	7B	27	12	Cold T
4. Long, Mary	21 Smith Ave.	13	F	7A	15	24	T
5. Smith, Florence	48 Prairie Ave.	13	F	8B	9	24	Aches Runs

* T refers to Tonsils

Figure 5. Sample of Letter Sent to Principal and Teachers

DEPARTMENT OF PUBLIC SCHOOLS
Providence, Rhode Island

- - -

Health and Physical Education

- - -

Principal and Teachers:

Will you please see that the pupils whose names are given on the enclosed list, and who have been found by the audiometer tests to have defective hearing, are given proper and careful consideration in seating, with the normal or better ear toward the teacher, so that they may get the full benefit of the teacher's instruction.

Thanking you for your co-operation, I am

Sincerely yours,

Charles B. Lewis, M. D.
Director

CBL:ELI

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Providence, Rhode Island

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Thanking you for your co-operation, I am

Sincerely yours,

Charles H. Lewis, M. D.
Director

CHL:ELL

Figure 6. Sample of Letter Sent Home to Parents

DEPARTMENT OF PUBLIC SCHOOLS
Providence, Rhode Island

\- - -

Health and Physical Education

\- - -

Dear Parent:

A hearing test recently given to_____ showed some defect in the _____ ear. You are advised to have an examination made by your family physician or ear specialist, if you have not done so recently.

Loss of hearing may be due to some conditions that can be removed or corrected. The purpose in requesting that attention be given to this defect is that the school may be able to plan programs that will better serve the needs of pupils whose hearing is below normal.

Will you please give the enclosed card and stamped envelope to your family physician or ear specialist at the time of the examination.

Thanking you for your cooperation, I am

Sincerely yours,

Charles B. Lewis, M.D.

CBL:ELI Director

Figure 8. Sample of Letter Sent Home to Parents

DEPARTMENT OF PUBLIC SCHOOLS
Providence, Rhode Island

- - -

Health and Physical Education

- - -

Dear Parent:

A hearing test recently given to _____ showed some defect in the _____ ear. You are advised to have an examination made by your family physician or ear specialist, if you have not done so recently.

Loss of hearing may be due to some conditions that can be removed or corrected. The purpose in requesting that attention be given to this defect is that the school may be able to plan programs that will better serve the needs of pupils whose hearing is below normal.

Will you please give the enclosed card and stamped envelope to your family physician or ear specialist at the time of the examination.

Thanking you for your cooperation, I am

Sincerely yours,

Charles G. Lewis, M.D.
Director

CGL:ELI

Figure 7. Report of Audiometer Hearing Test Sent Home to Parents

HEALTH SERVICE

Report of Audiometer Hearing Test

Name_____ School_____

Address_____

This pupil showed a hearing loss of 9 sensation units (9%) or more in the _____ ear. May we have information on your examination as follows:

Is defect probably temporary or permanent?
Will hearing probably improve under treatment?
Should pupil have instruction in lip-reading?

Signed_____
Physician

Please mail as soon as possible

(over)

Figure 8. Reverse Side of Report of Audiometer Hearing Test Sent Home to Parents

We solicit your cooperation so that the school may be able to plan programs that will better serve the needs of the pupils whose hearing is below normal.

Remarks.....

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Figure 7. Report of Audiometer Hearing Test Sent Home to Parents

HEALTH SERVICE

Report of Audiometer Hearing Test

Name _____ School _____

Address _____

This pupil showed a hearing loss of 9 sensation units (9S) or more in the _____ ear. May we have information on your examination as follows:

Is defect probably temporary or permanent?
Will hearing probably improve under treatment?
Should pupil have instruction in lip-reading?

Signed _____
Physician

Please mail as soon as possible

(over)

Figure 8. Reverse Side of Report of Audiometer Hearing Test Sent Home to Parents

We solicit your cooperation so that the school may be able to plan programs that will better serve the needs of the pupils whose hearing is below normal.

Remarks.....

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Figure 9. Sample Blank Form of Hearing Test

Name_____ Teacher's Name_____

Address_____

School_____ DO NOT MAKE ANY NOISE AS IT WILL SPOIL THE TEST

Grade_____ Age_____

Date_____ _____

INSTRUCTIONS

(1) Write your name, age, grade, etc. in the spaces above.
(2) You will hear numbers spoken by a person who is moving away from you. The voice will get weaker and weaker. Listen carefully and write as many numbers as you can.

Hearing Loss	RIGHT EAR				LEFT EAR				Hearing Loss
	1	2	3	4	5	6	7	8	
1									
30	54	56	85	64	48	55	48	38	30
27	41	68	83	46	23	54	63	43	27
24	84	63	42	42	66	88	83	52	24
21	51	14	18	82	41	42	32	51	21
18	18	34	61	21	81	23	85	22	18
15	23	12	35	15	66	85	63	56	15
12		31		85	21				12
9		62							9
6	33			11				18	6
3									3
0									0
-3									-3

Hearing Loss 12 Hearing Loss 15

Did you ever have an ache or pain in your ear?_____
Which ear?_____ When?_____
Did you ever have a running ear?_____ Which ear?_____ When?___
Does it run now?_____
Do you ever have noises in your ear, like buzzing, hissing, or roaring?_____ Which ear?_____ When?_____
Have you ever had your tonsils or adenoids removed?
Is any member of your family hard of hearing?_____
Have you ever had a mastoid operation?_____
Have you a cold now?_____

[1]These numbers indicate sensation units

Figure 8. Sample Blank Form of Hearing Test

Name _____ Teacher's Name _____

Address _____

School _____

Grade _____ Age _____

Date _____

DO NOT MAKE ANY NOISE AS IT WILL SPOIL THE TEST

INSTRUCTIONS

(1) Write your name, age, grade, etc. in the spaces above.
(2) You will hear numbers spoken by a person who is moving away from you. The voice will get weaker and weaker. Listen carefully and write as many numbers as you can.

Hearing Loss	RIGHT EAR								LEFT EAR								Hearing Loss
	1	2	3	4	5	6	7	8									
1																	
20	54	50	85	64	48	55	49	58									30
27	41	68	83	46	25	54	65	45									27
24	84	65	42	42	83	83	85	52									24
21	31	14	18	82	41	42	62	51									21
18	18	24	81	21	81	25	85	22									18
15	25	12	25	15	68	36	55	56									15
12		31		85	21												12
9		82															9
6	62			11				18									6
3																	3
0																	0
-3																	-3

Hearing Loss 12 Hearing Loss 15

Did you ever have an ache or pain in your ear? _____

Which ear? _____ When? _____

Did you ever have a running ear? _____ Which ear? _____ When? _____

Does it run now? _____

Do you ever have noises in your ear, like buzzing, blasting, or roaring? _____ Which ear? _____ When? _____

Have you ever had your tonsils or adenoids removed? _____

Is any member of your family hard of hearing? _____

Have you a cold now? _____

[1]These numbers indicate sensation units

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